

REMARKS

Reconsideration and allowance of the present patent application based on the foregoing amendment and following remarks are respectfully requested.

By this Amendment, claim 23 is amended. No new matter has been added. Claims 1-22, 33 and 34 are withdrawn from consideration as being directed to non-elected inventions. After entry of this Amendment, claims 1-34 will remain pending in the patent application.

As a preliminary matter, Applicant notes that the Examiner has withdrawn claim 34, which was presented in Applicant's Amendment dated August 5, 2005. However, claim 34 depends from claim 25 and is therefore part of species (ii), which was elected with traverse by Applicant. Accordingly, it is respectfully requested that claim 34 be treated on the merits in the next communication from the Office. In the event the Examiner does not allow claim 34 in the next Office Action, Applicant respectfully submits that a new, non-final Office Action must be issued setting a new period for reply. (See MPEP §706.07)

Claims 23, 24 and 25 were rejected under 35 U.S.C. §103(a) based on Adachi et al. (U.S. Pub. No. 2002/0106818) (hereinafter "Adachi") in view of Almogy (U.S. Pub. No. 2003/0123040). The rejection is respectfully traversed.

MPEP §2142 states: "to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." It is respectfully submitted that the combination of Adachi and Almogy fails to present a *prima facie* case of obviousness.

The Examiner concedes at page 3, lines 14-15 of the Office Action that "Adachi et al. does not disclose 'providing a substrate coated with a photoresist layer having reduced memory reaction characteristics.'" However, there are additional features that are absent in Adachi.

For example, Adachi fails to disclose, teach or suggest a device manufacturing method with a lithographic system, the method comprising, *inter alia*, "employing a patterning device to impart said beam of radiation with a pattern in its cross-section in which said pattern is decomposed into at least two constituent sub-patterns; exposing a first of said at least two constituent sub-patterns by directing said beam of radiation beam through said

first sub-pattern such that said lithographic system produces a first sub-pattern image onto a target area of said pre-specified photoresist layer of said substrate;...exposing a second of said at least two constituent sub-patterns by directing said beam of radiation through said second sub-pattern such that said lithographic system produces a second sub-pattern image onto said target area of said pre-specified photoresist layer of said substrate, wherein said exposing of the first of said at least two constituent sub-patterns and said exposing of the second of said at least two constituent sub-patterns combine said first and second sub-pattern images to produce a desired pattern on said target area of said substrate,” as recited in claim 23.

The Examiner refers to FIG. 1 and col. 4-6 of Adachi as allegedly disclosing, teaching or suggesting “exposing a first of said at least two constituent sub-patterns by directing said beam of radiation beam through said first sub-pattern such that said lithographic system produces a first sub-pattern image onto a target area of said pre-specified photoresist layer of said substrate;...exposing a second of said at least two constituent sub-patterns by directing said beam of radiation through said second sub-pattern such that said lithographic system produces a second sub-pattern image onto said target area of said pre-specified photoresist layer of said substrate.” Respectfully, those cited portions merely disclose exposing a first resist layer with a first lithographic system (*e.g.*, a scanner exposure unit) and exposing a second resist layer with a second lithographic system (*e.g.*, a step and repeat exposure unit). (*See, e.g.*, paragraphs 8-10 and 35-38 of Adachi).

There is nothing in Adachi that remotely discloses, teaches or suggests consecutively exposing two sub-patterns of the same target area of the same pre-specified photoresist layer with the same lithographic system, as in claim 23. On the contrary, Adachi makes clear that once the first pattern is exposed with the scanner exposure apparatus (1st lithographic system), the image of the first pattern in a first layer is etched to define the first pattern in the first layer. (*See, e.g.*, paragraph 36 of Adachi). Then, after defining the first pattern, a second pattern is exposed with a stepper exposure apparatus (2nd lithographic system) on a “so called rough layer or the like” and then etched to define a second pattern. (*See, e.g.*, paragraph 37 of Adachi). A difference in position between the first and second patterns may be measured. (*See, e.g.*, paragraph 39 of Adachi). Thus, unlike claim 23, Adachi does not 1) use the same lithographic system to perform the first and second exposure and does not 2) expose the same target area of the same pre-specified photoresist layer.

In addition, there is nothing in Adachi that remotely discloses, teaches or suggests “employing a patterning device to impart said beam of radiation with a pattern in its cross-

section in which said pattern is decomposed into at least two constituent sub-patterns...wherein said exposing of the first of said at least two constituent sub-patterns and said exposing of the second of said at least two constituent sub-patterns combine said first and second sub-pattern images to produce a desired pattern on said target area of said substrate.” As stated previously, the first pattern and the second pattern of Adachi are not sub-patterns of a same pattern. Nor are the first pattern and the second pattern of Adachi combined to produce a desired pattern on a target area of the substrate. The first and second patterns of Adachi are performed on different layers and, as such, cannot be part of a same desired pattern. Adachi states “the second patterning step (S2) includes a second exposure step (S21) and a second pattern forming step (S22) for performing patterning of a so-called rough-layer or the like on the aforementioned wafer subsequent to the first patterning step (S1).” (See paragraph 37 of Adachi, emphasis added).

Almogy fails to remedy the deficiencies of Adachi. Almogy merely discloses using a maskless high resolution and high data rate spot grid array printer system in combination with memoryless photoresist in order to suppress side-lobe formation on the substrate. (See paragraphs 13-14 of Almogy. Therefore, any reasonable combination of Adachi and Almogy cannot result in any way in the invention of claim 23. Thus, for at least these reasons, the combination of Adachi and Almogy fails to present a *prima facie* case of obviousness.

Furthermore, a proper motivation for combining the teachings of Adachi and Almogy has not been established. The alleged motivation, “for at least the purpose of avoiding integrating the energies of consecutive exposures” does not appear to have any relevance either to the claims or to the combination of Adachi and Almogy and no evidence in any of the references is provided to support this conclusion.

There is no indication that Adachi would suffer from integrating the energies of consecutive exposures. On the contrary, Adachi discloses that after exposing the first pattern, the substrate is etched to define the first pattern in the first layer. (See FIG. 1 of Adachi). As such, since the first resist used in the exposure cannot be exposed with the second lithographic process, there cannot be any concern about integrating the energies of consecutive exposures. Therefore, there is clearly no motivation to use a memoryless photoresist in Adachi, as suggested by the Examiner.

In addition, Adachi discloses forming a first and a second pattern onto a substrate with mask/patterning devices using a first and a second exposure process. By contrast, Almogy discloses using maskless lithography to improve resolution of the imaged pattern. (See paragraph 6 of Almogy). However, by virtue of teaching that masks/patterning devices

have become increasingly difficult and expensive to make and that it is desirable to provide a practical, maskless direct write system with improved resolution and throughput for improved lithography, Almogy teaches away from the lithographic process of Adachi. (See paragraphs 6 and 10). As such, *per* MPEP §2145, Applicant respectfully submits that it would not have been obvious to combine the teachings of these references. Thus, for at least this reason, the combination of Adachi and Almogy is improper and the rejection of claim 1 must be withdrawn.

Claims 24 and 25 are patentable over Adachi, Almogy and a combination thereof at least by virtue of their dependency from claim 23 and for the additional features recited therein.

Accordingly, reconsideration and withdrawal of the rejection of claims 23, 24 and 25 under 35 U.S.C. §103(a) based on Adachi in view of Almogy are respectfully requested.

Claims 26 and 29-30 were rejected under 35 U.S.C. §103(a) based on Adachi in view of Almogy and Boettiger *et al.* (U.S. Pat. No. 5,111,240) (hereinafter "Boettiger"). Claims 27-31 were rejected under 35 U.S.C. §103(a) based on Adachi in view of Almogy, Boettiger and Hsu *et al.* (U.S. Pub. 2003/0044722) (hereinafter "Hsu"). Claim 28 was rejected under 35 U.S.C. §103(a) based on Adachi in view of Almogy and Nakamura *et al.* (U.S. Pub. 2003/0064307) (hereinafter "Nakamura"). Claim 32 was rejected under 35 U.S.C. §103(a) based on Adachi in view of Almogy, Boettiger and Nakamura. These rejections are respectfully traversed.

Claims 26-32 are patentable over Adachi, Almogy and a combination thereof at least by virtue of their dependency from claim 23 and for the additional features recited therein.

Boettiger, Hsu and Nakamura fail to remedy the deficiencies of Adachi and Almogy.

Boettiger merely discloses forming a photoresist pattern with openings having inclined walls where the inclination angle can be varied in a wide range independently of the photoresist thickness. (See, *e.g.*, col. 3, lines 14-18 of Boettiger).

Hsu merely discloses a double exposure process to reduce CD bias of a desired pattern between the center and the edge of the substrate. (See, *e.g.*, paragraph 10 of Hsu). Specifically, Hsu discloses exposing the center of the substrate with a desired pattern using a first lithographic parameter, developing and etching the desired pattern produced with the first lithographic parameter, exposing the edge of the substrate with the same desired pattern using a second lithographic parameter, and then developing and etching the desired pattern produced with the second lithographic parameter. (See, *e.g.*, paragraph 13 of Hsu).

Nakamura merely discloses forming a latent image of a fine mark that is suited for aligning with a high accuracy. (*See, e.g.*, paragraph 19 of Nakamura).

However, none of the Boettiger, Hsu and Nakamura references disclose, teach or suggest a device manufacturing method with a lithographic system, the method comprising, *inter alia*, “employing a patterning device to impart said beam of radiation with a pattern in its cross-section in which said pattern is decomposed into at least two constituent sub-patterns; exposing a first of said at least two constituent sub-patterns by directing said beam of radiation beam through said first sub-pattern such that said lithographic system produces a first sub-pattern image onto a target area of said pre-specified photoresist layer of said substrate;...exposing a second of said at least two constituent sub-patterns by directing said beam of radiation through said second sub-pattern such that said lithographic system produces a second sub-pattern image onto said target area of said pre-specified photoresist layer of said substrate, wherein said exposing of the first of said at least two constituent sub-patterns and said exposing of the second of said at least two constituent sub-patterns combine said first and second sub-pattern images to produce a desired pattern on said target area of said substrate.” Accordingly, any proper combination of Adachi, Almogy, Boettiger, Hsu and Nakamura cannot result, in any way, in the inventions of claims 26-32.

The rejection having been addressed, Applicant respectfully submits that the application is in condition for allowance, and a notice to that effect is earnestly solicited.

If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

FINDERS ET AL. — 10/765,218
Client/Matter: 081468-0304531

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

PILLSBURY WINTHROP SHAW PITTMAN LLP



CHRISTOPHE F. LAIR

Reg. No. 54248

Tel. No. 703.770.7797

Fax No. 703.770.7901

JSB/CFL/smm
P.O. Box 10500
McLean, VA 22102
(703) 770-7900